

CLAIMS

1. An internal combustion rotary engine comprising : a casing forming a cylindrical chamber and having a number of holes and ducts as part of the cooling- and the lubrication systems , end covers that support the main engine shaft and are securely fixed on the sides of the casing ,a rotor as a means for delivering power including piston chambers (replacing cylinders in conventional engines) , rotationally reciprocating pistons in piston chambers to convert the expansion of combustion gas to rotational motion , piston pins allowing pistons to rotate around the pin axes , planet gears mounted on one or both side(s) of the rotor by fixing supports and piston rods that synchronize the rotation of both the pistons and the said planet gears where the planet gears are meshed with a sun gear(s) fixed on one or both side(s) of the casing on the engine block and the rotation of the planet gears around their own axes at the combustion stroke causes them to move on the sun gear(s) and causes the said rotor to rotate around the main shaft axis .
2. An internal combustion rotary engine as defined in claim 1 , wherein there is(are) a circular seal(s) at each side of the outer surface of the rotor and there is(are) a straight transverse seal(s) close to the edge of the piston chambers on the outer surface of the rotors preventing gas leakage ,also there are four seals on each piston (one seal on each contacting side of the piston) for gas sealing and ports on the casing for each engine block as air-fuel mixture intake port(s) and exhaust gas outlet port(s) ;spark plug(s) is(are) located on the casing and will initiate the ignition of compressed air-fuel mixture .In diesel type of this engine , fuel injector(s) replaces the spark plug(s) .

3. An internal combustion rotary engine as defined in claim 1 , wherein the cooling system of the engine comprises : two end covers for each engine block , mounted on the sides of the casing , their end plates and longitudinal holes passing through the casing ;the lubrication system also acts as a cooling system and is introduced in claim no. 4 ; the cooling water from the radiator or the water pump enters the water inlet port on one of the end plates , then enters a closed area formed by the end plate and the end cover inner walls and flows to the closed area at the other side of the casing by passing through the said longitudinal holes in casing , and then flows into another closed area on the first side ; water flows several times to the second end cover (in to a different closed area) and back again to the first end cover (in to a different closed area) and finally flows to the last closed area in the first end cover and leaves the engine through an outlet port and heads for the water pump .
4. An internal combustion rotary engine as defined in claim 1 , wherein the lubrication system comprises : an oil-tank as the oil reservoir , a strainer , a duct at the bottom of the casing in order for oil to flow from the strainer to the outlet for the oil pump, an inlet port on one of the end covers with its related duct on the casing in order for the excess oil to return to the oil tank , an inlet port on the end cover to receive oil from the oil pump or the oil cooler in order for oil to flow to the oil filter seated on the casing ; oil comes out through the oil filter , entering a duct in the casing at the top which has many small holes through the inner surface of the casing for the lubrication of the gears ; and the remaining oil in the duct enters a second duct in one of the end covers ;this oil goes for the lubrication of the rotor , the shaft bearing and the inner surface of the casing where it is in touch with the rotor ; oil reaches the rotor shaft at the

bearing through the second duct and enters the hole in the shaft ;also there is a groove on the shaft at each bearing position for lubrication ;the oil in the shaft hole flows through several smaller radially located holes and goes for the piston chambers and the other shaft bearing ;the oil in those holes provided for the lubrication of the piston chambers passes through components called “oil bridge” that includes two small outlet ports , one nozzle-shaped hole in order for oil to enter the piston chamber area to lubricate the chamber and the piston ;the remaining oil flows through the second hole to a duct in the rotor which goes for the lubrication of the cylindrical area of the piston and its corresponding surface of the chamber ;then the oil leaves the rotor through a small hole to lubricate the outer surface of the rotor and the inner surface of the casing using an oil flow limiter through which oil passes in a controlled manner and from whose sides the excess oil can come out ;also there are holes on rotor sides to lead oil out of the chamber after lubricating the chamber and the pistons .After lubrication, oil in the casing flows to the oil tank via openings at the bottom of the casing on both sides .

5. An internal combustion rotary engine as defined in claim 1 , wherein the shape of the piston end profile could be adjusted in order to achieve a desired compression ratio ; these parameters and the position of the spark plug(s) affect the performance of the mixture combustion .
6. An internal combustion rotary engine as defined in claim 1 , wherein the rotor can rotate in just one direction ; to identify the direction of rotation , the hinged connection of a planet gear and piston rod should not cross the imaginary line connecting the center of the planet gear and the center of the sun gear at combustion stroke .

7. An internal combustion rotary engine as defined in claim 1 , wherein a lock mechanism mounted on the rotor shaft will prevent the rotor from moving along the shaft ;the mechanism comprises : a lever , a tongue , a spring , a washer , a slotted hex nut and a cotter pin ; to lock the rotor , the lever is pulled and rotated CW (CCW) , then pushed to its rest position ; to release the rotor , the lever is pulled, rotated in opposite direction, CCW (CW) , and finally pushed ;at the time of locking , the tongue will go through a hole in the rotor .
8. An internal combustion rotary engine as defined in claim 1 , wherein to improve the gas sealing of the front area of the piston where the two seals meet each other , the ends of the seals are shaped so that they cover each other in this area and provide an air-tight sealing .
9. An internal combustion rotary engine as defined in claim 1 , wherein the corner seals are used where circular seals and transverse seals meet each other on the outer surface of the rotor .
10. An internal combustion rotary engine as defined in claim 1 , wherein the air-fuel intake stroke and the exhaust stroke can not overlap at any time unless it is part of the design requirements .
11. An internal combustion rotary engine as defined in claim 1 , wherein the piston rod is under tension in combustion , exhaust and compression strokes and is under compression only in the intake stroke .
12. An internal combustion rotary engine as defined in claim 1 , wherein the engine comprises a plurality of engine blocks .
13. An internal combustion rotary engine as defined in claim 1 , wherein each engine block consisting of a rotor and its related casing and end covers .

14. An internal combustion rotary engine as defined in claim 1 , wherein the number of complete working strokes (one working stroke comprises intake stroke , compression stroke , combustion stroke and exhaust stroke) per revolution of the main shaft for each piston is n where n can be 1,2,3,... and the value of n is unique for an engine block .
15. An internal combustion rotary engine as defined in claim 1 , wherein the number of pistons in each engine block is equal to $4*n$.
16. An internal combustion rotary engine as defined in claim 1 , wherein the gear teeth ratio of the sun gear to the planet gear is expressed as $2*n$.
17. A compressor comprising : a casing forming a cylindrical chamber and having a number of holes and ducts as part of the cooling- and the lubrication systems , end covers that support the main compressor shaft and are securely fixed on the sides of the casing , a rotor as a means for receiving power including piston chambers (replacing cylinders in conventional compressors) , rotationally reciprocating pistons in piston chambers to intake and compress the fluid, piston pins allowing pistons to rotate around the pin axes , planet gears mounted on the rotor by fixing supports and piston rods that synchronize the rotation of both the pistons and the said planet gears ;the planet gears are meshed with a sun gear(s) fixed on the compressor block ;the rotation of the input shaft causes planet gears to rotate around their own axes and causes the pistons to reciprocate rotationally.
18. A compressor as defined in claim 17, wherein there is(are) a circular seal(s) at each side of the outer surface of the rotor and there is(are) a straight transverse seal(s) close to the edge of the piston chamber(s) on the outer surface of the rotor , preventing fluid leakage ; also there are four seals on

each piston (one seal on each contacting side of the piston) for sealing and there are ports on the casing for each compressor block as fluid intake port(s) and compressed-fluid exhaust port(s).

19. A compressor as defined in claim 17 comprising a plurality of compressor blocks with each compressor block consisting of a rotor and its related casing and end covers .